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NASA - Jet Propulsion Laboratory

SUPERFUND PROJECT

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WHAT IS SUPERFUND?

- ESTABLISHED BY CONGRESS IN 1980
- OFFICIALLY KNOWN AS THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA)
- REAUTHORIZED IN 1986 BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA)
- ALLOWS THE FEDERAL GOVERNMENT TO RESPOND DIRECTLY TO RELEASES, OR THREATENED RELEASES, OF HAZARDOUS SUBSTANCES THAT MAY ENDANGER PUBLIC HEALTH OR THE ENVIRONMENT
- SUPERFUND IS ACTUALLY A TRUST FUND
  - FUNDED BY TAXES
  - USED WHEN RESPONSIBLE PARTIES CANNOT BE FOUND, ARE UNABLE OR UNWILLING, TO PAY FOR CLEANUP
- SUPERFUND LAW ALLOWS FOR LEGAL ACTIONS AGAINST RESPONSIBLE PARTIES TO RECOVER SUPERFUND MONIES
  - SUBSTANTIAL PENALTIES CAN ALSO BE IMPOSED

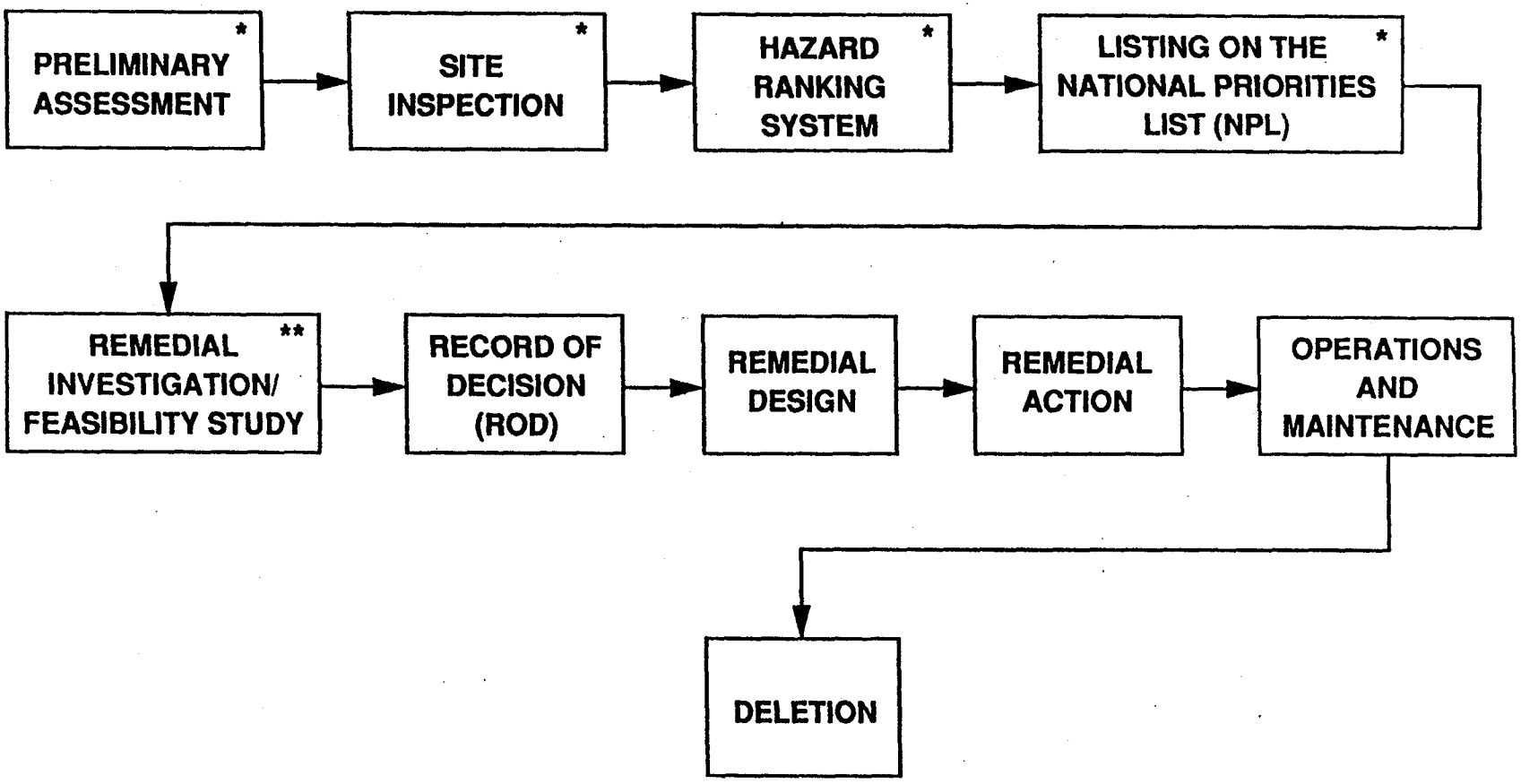
HOW DOES SUPERFUND WORK?

- BASED UPON DISCOVERY OF HAZARDOUS MATERIALS INCIDENT
  - CITIZEN COMPLAINTS
  - ROUTINE REPORTING
  - INSPECTIONS
  - PARTICULAR INCIDENT

- IF THE SITE POSES AN IMMINENT DANGER EMERGENCY ACTIONS ARE TAKEN
  - REMOVAL MATERIALS
  - RELOCATE RESIDENTS, etc.

- FOR NON-EMERGENCY SITUATION, OR AFTER EMERGENCY ACTIONS ARE COMPLETE, THE SITE ENTERS THE SUPERFUND "PROCESS"

THE SUPERFUND PROCESS



* COMPLETED
** IN PROCESS

SUPERFUND PROGRAM FACTS*

- HOW MANY SITES?
  - 56 SITES IDENTIFIED BUT NO ACTION TAKEN
  - 696 SITES IN STUDY OR DESIGN PHASE
  - 374 SITES IN CLEAN-UP PHASE
  - 109 SITES HAD CLEAN-UP COMPLETED
  - 40 SITES TOTAL WERE DELETED FROM THE LIST

- MORE THAN $13 BILLION SPENT THUS FAR, ONLY 3% OF THE SITES ARE CLEAN

- AT LEAST 20% OF FUNDING GOES TO "TRANSACTION COSTS"
  - 88% OF INSURANCE FUNDING GOES TO LEGAL COSTS

* *BASED ON 1992 DATA FROM THE TAUBMAN CENTER AT HARVARD UNIVERSITY, AND CORPORATION AND THE GAO*

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OVERVIEW OF JPL SUPERFUND KEY EVENTS

1980	CITY OF PASADENA WELLS SHOW VOC CONTAMINATION BELOW MCLS
APPROX 1986	PASADENA WELLS SEE ELEVATED LEVELS OF VOC'S
12/90	JPL/NASA INSTALL VOC REMOVAL SYSTEM FOR 4 PASADENA WELLS KNOWN TO BE THREATENED
	- Public Protected from Volatile Organics
1988	NASA/JPL COMPLETES PA/SI AS REQUIRED BY SARA
1990	EXPANDED SITE INSPECTION IS COMPLETED
	- 7 WELLS INSTALLED
	- SEEPAGE PITS IDENTIFIED AS POSSIBLE CONTAMINANT SOURCE
10/14/92	JPL LISTED ON NPL
12/23/92	FEDERAL FACILITIES AGREEMENT SIGNED
12/92	WELLS #8 THROUGH #11 COMPLETED
6/93	FIRST SERIES OF DOCUMENTS DUE TO AGENCIES
9/98	REMEDIAL INVESTIGATION FOR GROUNDWATER NEARING COMPLETION
	• GOES FINAL IN FEBRUARY 1999

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JPL/NASA INTERACTIONS

- JPL PROVIDED TEMPORARY PROJECT MANAGER UNTIL NASA-NMO HIRED PROJECT MANAGER

- JPL ACTS IN SUPPORT ROLE TO NASA
  - NASA IS LEAD ON ALL NEGOTIATIONS WITH AGENCIES
  - SEPARATE TASK ORDER ON CALTECH/NASA CONTRACT TASKS TO CALTECH REQUIREMENTS TO SUPPORT NASA IN FULFILLING PROJECT

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FEDERAL FACILITIES AGREEMENT (FFA)

- EPA CANNOT "FORCE" NASA TO RESPOND TO CERCLA
  - AGREEMENT BETWEEN FEDERAL AGENCIES IS NEEDED
- FFA IDENTIFIES THE INTER-RELATIONSHIP OF THE REGULATORY AGENCIES AND NASA
  - AGENCIES INCLUDE EPA, STATE DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) AND THE REGIONAL WATER QUALITY CONTROL BOARD (RWQCB)
- ESTABLISHES SCHEDULES, PENALTIES, REVIEW TIMES AND STATE REIMBURSEMENT
- SINCE NASA, NOT JPL, IS A SIGNATORY TO THE FFA, JPL NMO LED THE NEGOTIATIONS WITH JPL-ENVIRONMENTAL AFFAIRS SUPPORT
  - NASA HQ (CODE JE) ALSO HEAVILY INVOLVED
- FFA WAS SIGNED IN DECEMBER 1992

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DEVELOPMENT OF THE SITE HISTORY

APPROACH:

- JPL RECORDS WERE EXHAUSTIVELY RESEARCHED FOR POSSIBLE CLUES REGARDING SOURCES OF CONTAMINATION
  - JPL ARCHIVES
  - FACILITIES DRAWINGS DATING BACK TO THE 1940s
  - SITE PHOTOGRAPHS
- MANY CURRENT AND FORMER EMPLOYEES ALSO INTERVIEWED TO DETERMINE THE OPERATIONS AND THE LOCATIONS OF CONTAMINATION

RESULTS:

- 41 POSSIBLE LOCATIONS WERE IDENTIFIED AND EVALUATED FOR THEIR POTENTIAL TO CONTRIBUTE TO THE CONTAMINATION FOUND IN THE GROUNDWATER UNDER AND SURROUNDING JPL
- MOST WERE AREAS OR FACILITIES THAT USED CHEMICALS AND THEN PLACED THEM INTO SEEPAGE PITS OR DRY WELLS
  - SOME WERE OPEN DISPOSAL AREAS, STORM DRAINS AND OTHER SIMILAR SITES
  - OTHER AREAS BECAME KNOWN DURING THE COURSE OF TIME (e.g. O.I.L. BUILDING)

THESE WERE facilities,

- ALL USED IN 1940's + 1950's
  The lab in Sm
  — Severed in 1960's

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JPL CERCLA PROJECT "OPERABLE UNITS"

- AN OPERABLE UNIT IS A PORTION OF A GIVEN PROJECT THAT CAN BE DEALT WITH AS A DISCRETE UNIT OF THE ENTIRE SITE
- JPL HAS BEEN BROKEN DOWN INTO THREE (3) OPERABLE UNITS
  - OU-1: ON-SITE GROUNDWATER
  - OU-2: ON-SITE SOURCES (PITS, CESSPOOLS)
  - OU-3: OFF-SITE GROUNDWATER

Describe Basin

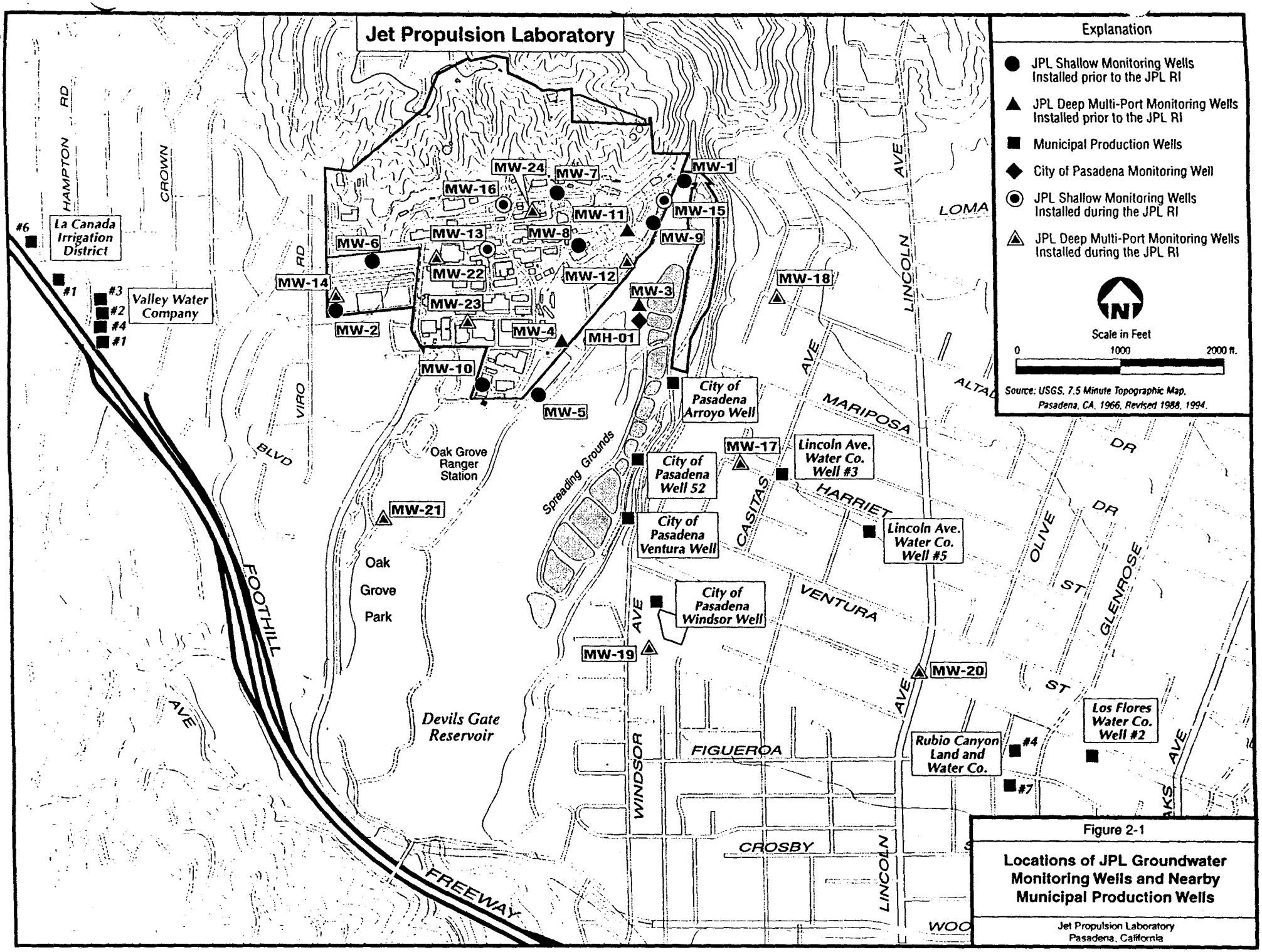

Figure 2-1

Locations of JPL Groundwater Monitoring Wells and Nearby Municipal Production Wells

Jet Propulsion Laboratory
Pasadena, California

OPERABLE UNIT #1 APPROACH

- INSTALL A TOTAL OF 16 GROUNDWATER MONITORING WELLS ON-SITE AND IN THE ARROYO
  - WELLS ARE CAPABLE OF MONITORING BOTH HORIZONTAL AND VERTICAL EXTENT OF CONTAMINATION
- SAMPLE ALL WELLS IN WET AND DRY SEASONS FOR CONTAMINANTS
  - VOCs AND OTHERS
- DEVELOP 3-D UNDERSTANDING OF CONTAMINANT DISTRIBUTION
  - SUPPLEMENT WITH COMPUTER MODELING
- EVALUATE ALTERNATIVES FOR REMEDIAL ACTION NEEDED (IF ANY)

OPERABLE UNIT #2 APPROACH

- PERFORM SOIL VAPOR ANALYSES AT IDENTIFIED SEEPAGE PIT LOCATIONS
  - ANALYZE FOR VOCs
- SAMPLE SOIL AT 24 LOCATIONS FOR NON-VOLATILE CONTAMINATION (METALS, etc.)
- INSTALL NESTED SOIL VAPOR WELLS AT THE SOIL SAMPLE LOCATIONS
  - HELPS TO DETERMINE VERTICAL DISTRIBUTION OF SOIL VAPORS
- DEVELOP 3-D UNDERSTANDING OF SOIL VAPOR AND SOIL CONTAMINATION
- EVALUATE REMEDIAL ALTERNATIVES REQUIRED (IF ANY)

OPERABLE UNIT #3 APPROACH

- INSTALL FIVE (5) WELLS IN ALTADENA AND PASADENA
  - WELLS ARE CAPABLE OF MONITORING BOTH HORIZONTAL AND VERTICAL EXTENT OF CONTAMINATION
- SAMPLE ALL WELLS IN WET AND DRY SEASONS FOR CONTAMINANTS
  - VOCs AND OTHERS
- DEVELOP 3-D UNDERSTANDING OF CONTAMINANT DISTRIBUTION
  - SUPPLEMENT WITH COMPUTER MODELING
- EVALUATE ALTERNATIVES FOR REMEDIAL ACTIONS (IF ANY)

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COMMUNITY RELATIONS PREPARATIONS IN OU-3

- PROJECT WORKING GROUP DEVELOPED A FACT SHEET FOR GENERAL AREA RESIDENTS THAT EXPLAINED THE OVERALL PROGRAM
- PSO DEVELOPED A SPECIFIC LETTER FOR AREA RESIDENTS DIRECTLY AFFECTED BY THE WELL CONSTRUCTION
  - WAS HAND DELIVERED BY PSO
- MET WITH THE CONGREGATION AND PASTOR OF THE ALTADENA SEVENTH DAY ADVENTIST CHURCH TO ALLAY POSSIBLE CONCERNS
- MET WITH CITY OF PASADENA OFFICIALS TO ALLAY CONCERNS REGARDING WELL PLACEMENT ON PASADENA PROPERTY

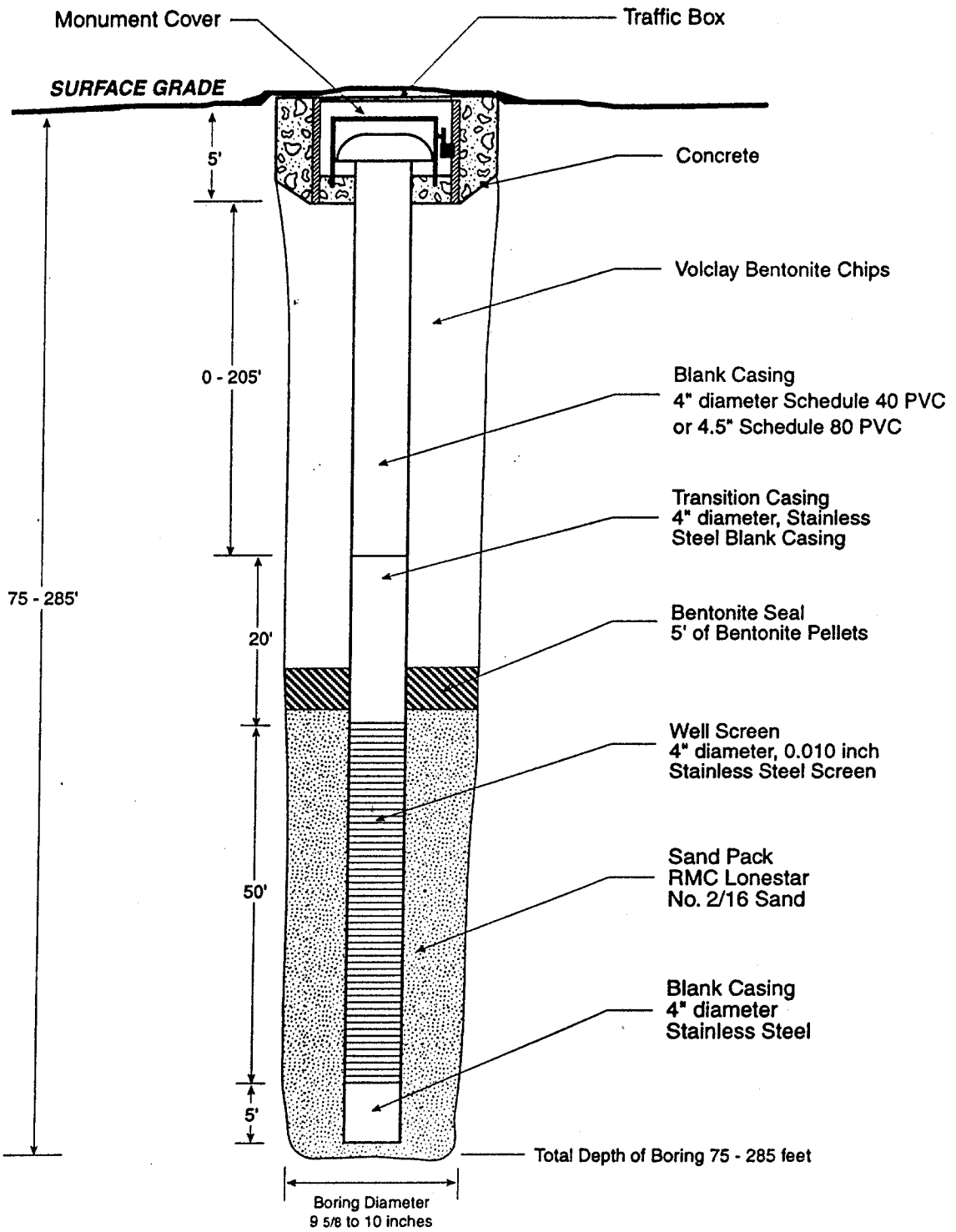

Figure 2-2

Design of Typical Shallow Groundwater Monitoring Well

Jet Propulsion Laboratory
Pasadena, California

1572.0223

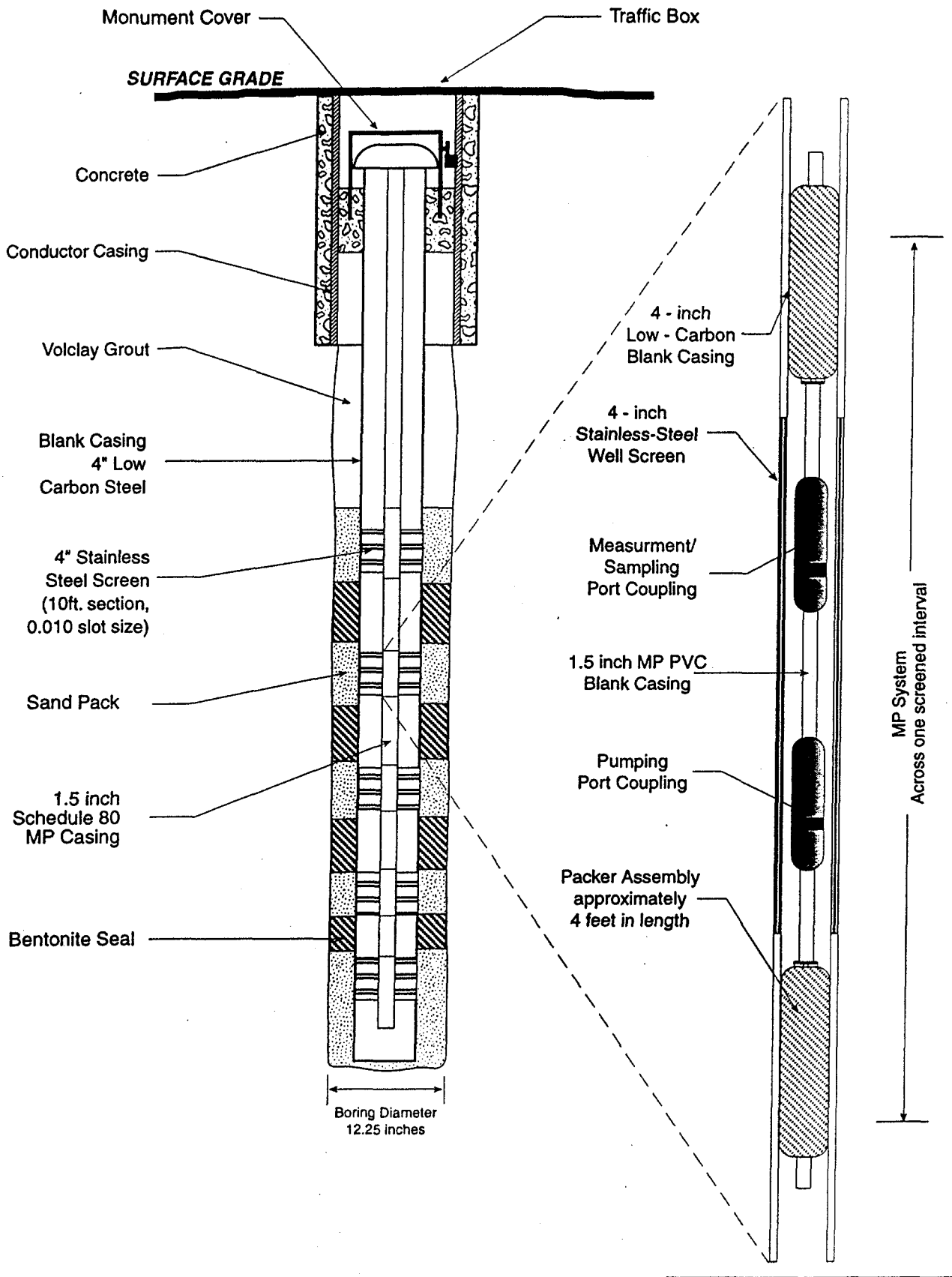

Figure 2-4

Typical Multi-Port (MP) Monitoring Well Casing Installation

Jet Propulsion Laboratory
Pasadena, California

1572.0223

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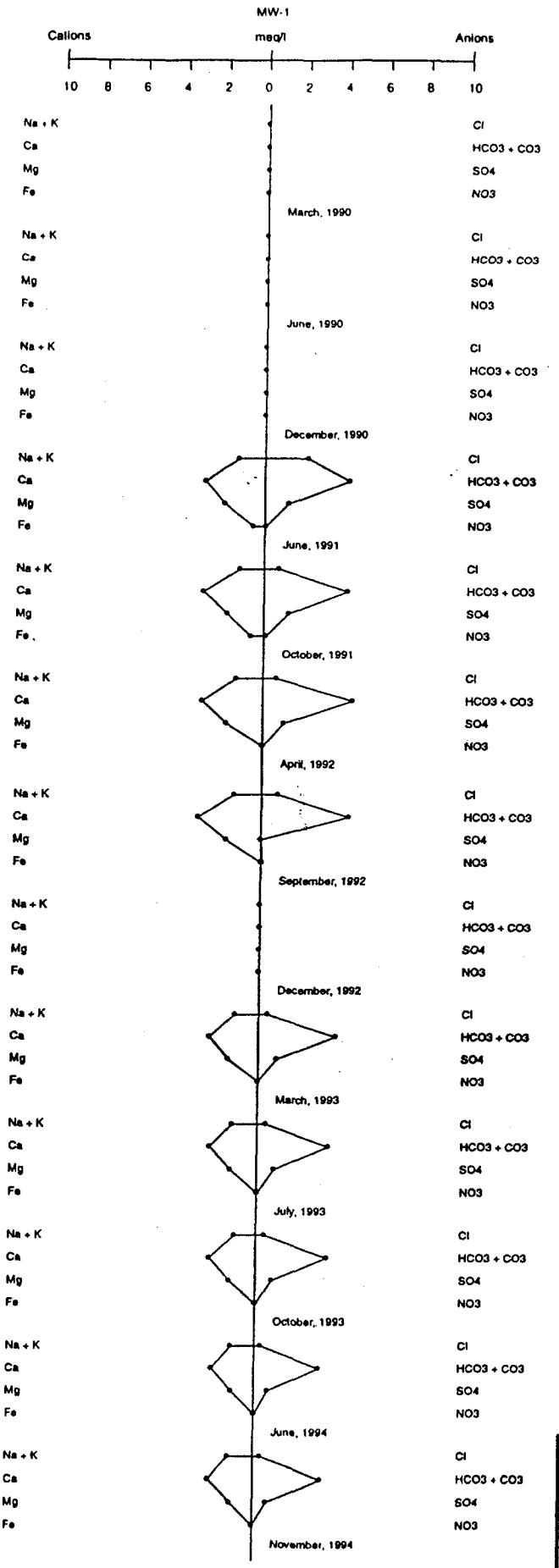
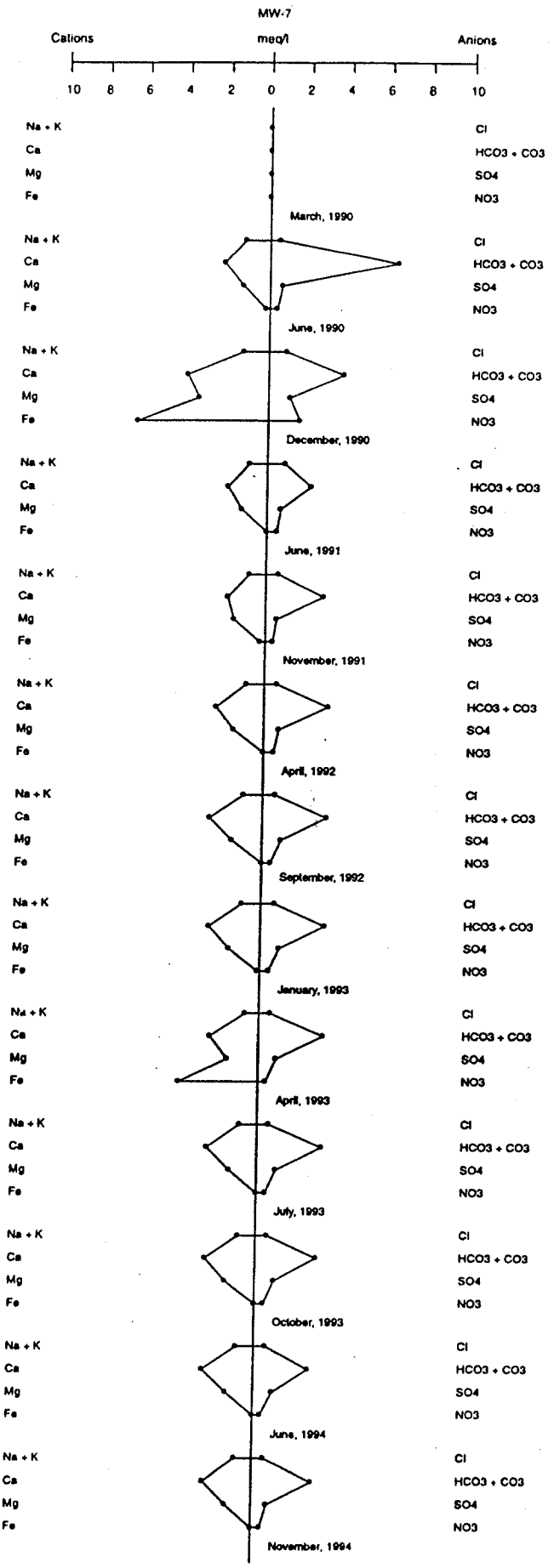
INITIAL DATA INDICATE UNUSUAL ANALYTE DISTRIBUTION

- WELL MW-10 SHOWS UNUSUAL DISTRIBUTION OF VOCS
- WATER CHEMISTRY REVIEWED TO DETERMINE POSSIBLE CAUSE
  - STIFF DIAGRAMS COMPARISON
- ANALYSIS SHOWS POSSIBLE OTHER SOURCE(S)



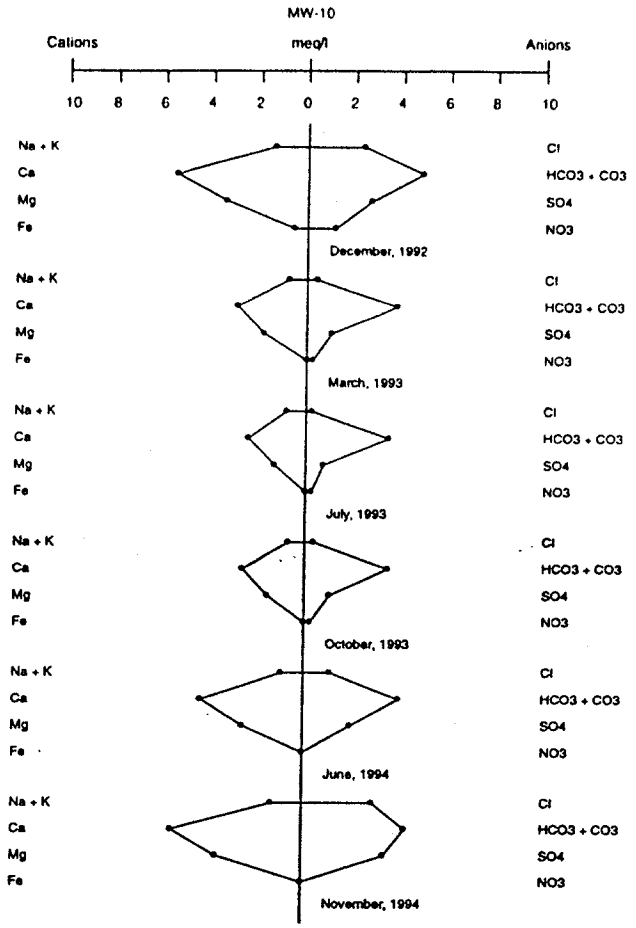
Stiff Diagrams for MW-1

FOSTER WHEELER ENVIRONMENTAL CORPORATION



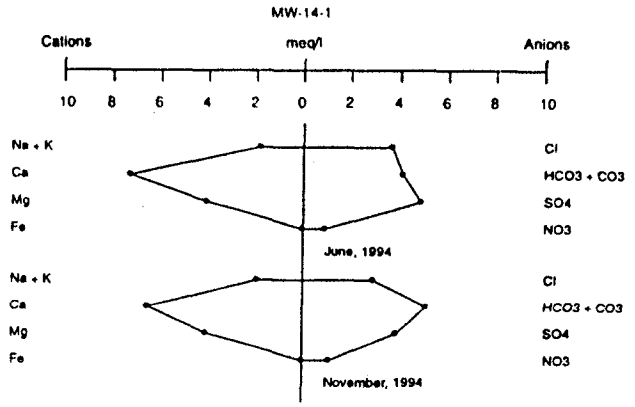
Stiff Diagrams for MW-7

FOSTER WHEELER ENVIRONMENTAL CORPORATION



Stiff Diagrams for MW-10

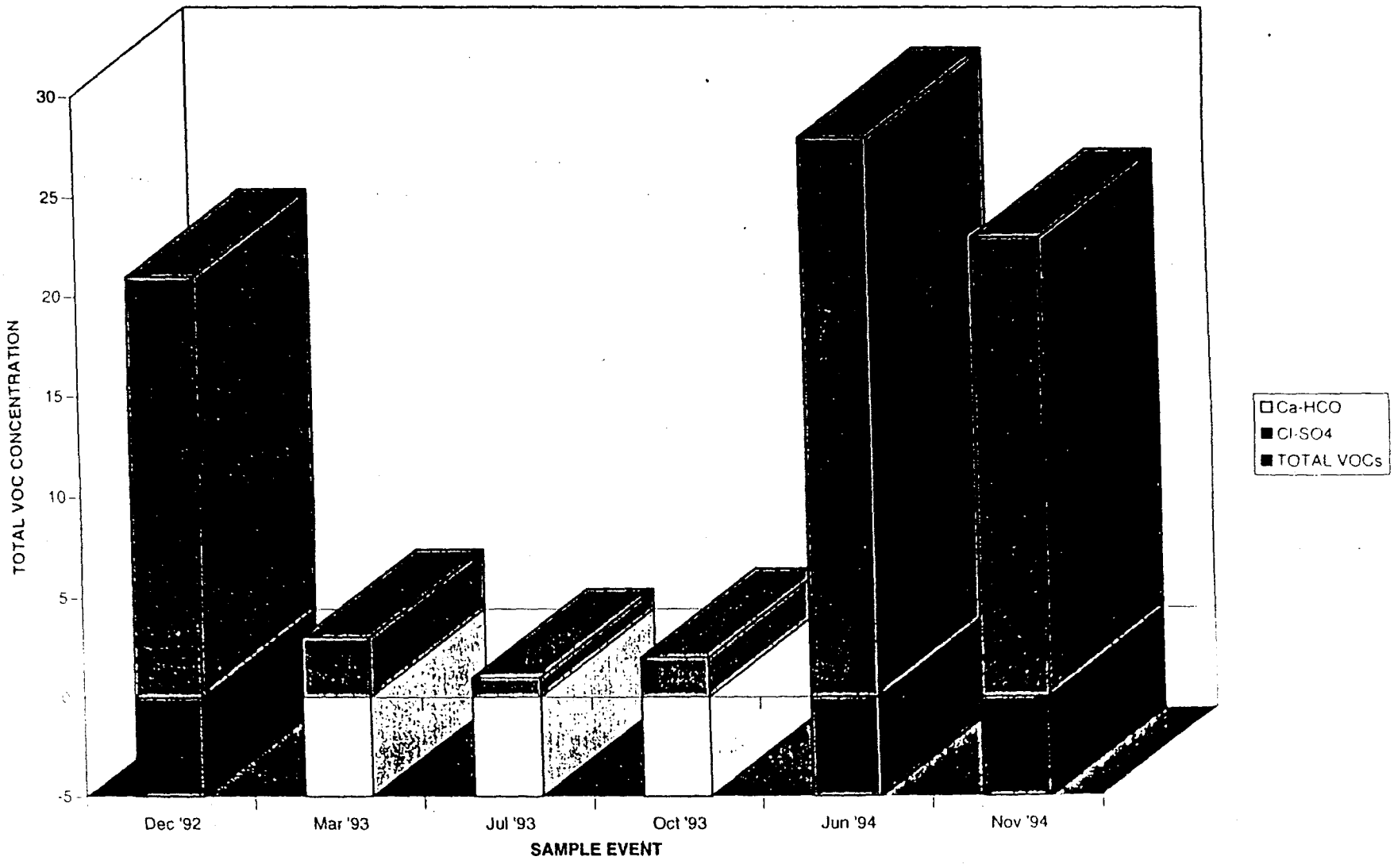
FOSTER WHEELER ENVIRONMENTAL CORPORATION



Stiff Diagrams
for
MW-14-1

FOSTER WHEELER ENVIRONMENTAL CORPORATION

WATER TYPE AND VOC TOTAL CONCENTRATIONS



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ADDITIONAL ON-SITE INVESTIGATIVE EFFORTS

- 3 ADDITIONAL MULTIPORT WELLS
- ADDITIONAL SOIL BORINGS / VAPOR WELLS
- LIMITED INVESTIGATION IN THE ARROYO SECO (2 trenches)

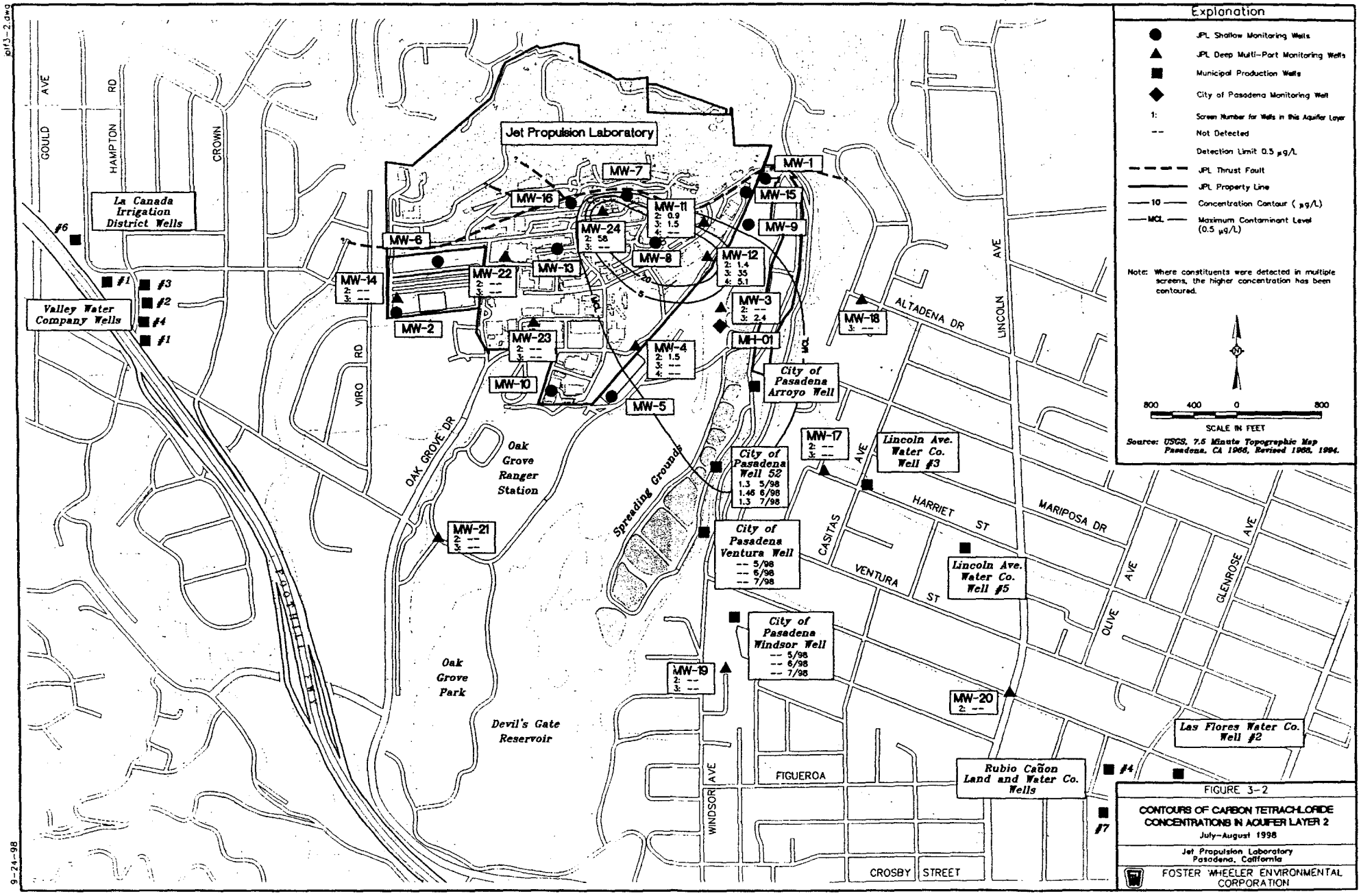

FIGURE 3-2

CONTOURS OF CARBON TETRACHLORIDE CONCENTRATIONS IN AQUIFER LAYER 2

July–August 1998

Jet Propulsion Laboratory
Pasadena, California

FOSTER WHEELER ENVIRONMENTAL CORPORATION

9-24-98

NEXT STEPS

- SUPERFUND PROCESS CALLS FOR DETERMINING FEASIBILITY OF VARIOUS REMEDIES
- JPL IS LOOKING AT SEVERAL POSSIBILITIES BY RUNNING PILOT PLANT STUDIES AND STUDYING FULL-SCALE OPERATIONS:
  - ION EXCHANGE FOR PERCHLORATE
  - CARBON/AIR STRIPPING FOR VOC
  - VACUUM EXTRACTION ON SOILS FOR VOCS

ION EXCHANGE TECHNOLOGY

- USES SPECIAL RESIN WHICH REMOVES PERCHLORATE FROM WATER
- RESIN CAN BE REGENERATED WITH BRINE FOR CONTINUED USE
- REGENERATE BRINE CAN BE TREATED TO REMOVE PERCHLORATE BEFORE DISPOSAL
  - JPL IS WORKING TO MINIMIZE THIS
- WATER QUALITY OF FINAL PRODUCT IS DRINKING WATER QUALITY

CARBON/AIR STRIPPING FOR VOCs

- BOTH ARE WELL KNOWN TECHNOLOGIES
  - BOTH USED BY LOCAL WATER PURVEYORS
- CARBON USES ACTIVATED CARBON TO REMOVE VOCs
  - SIMILAR PRINCIPLE TO HOME FILTERS, ONLY LARGER SCALE
- AIR STRIPPING
  - BREAKS SOLVENT CONTAINING WATER INTO A FINE SPRAY
  - THESE FINE PARTICLES OF WATER ARE DIRECTED THROUGH TURBULENT AIR FLOW
  - AIR FLOW CAUSES THE SOLVENTS TO EVAPORATE INTO THE AIR
  - THIS AIR IS THEN FILTERED TO REMOVE THE SOLVENTS
  - THE SOLVENT-FREE WATER EXITS THE SYSTEM

SOIL VAPOR EXTRACTION

- SMALL SPACES BETWEEN SOIL PARTICLES ARE FILLED WITH AIR ABOVE THE WATER TABLE
- VOC'S EVAPORATE AND FILL THESE AIR SPACES WITH VOC VAPOR
- VACUUM EXTRACTION USES A WELL AND A VACUUM PUMP TO PULL THESE VAPORS OUT OF THE SOIL
- VOCs IN THIS AIR STREAM ARE DIRECTED TO A SYSTEM TO REMOVE THE VOC FROM THE AIR